Magnetic
Harvest

PLANET MASTER

PLANET MASTER

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"Flesh and fleece, fur and feather,
Grass and greenworld all together . . ."

—Gerald Manley Hopkins

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I. PROGRAM OPERATION

System requirements. Apple II or II+ with 48K, Applesoft in ROM, one disk drive (DOS 3.3).

Booting the disk. Boot the disk in the standard manner as explained in "Apple II: The DOS Manual". This is normally done by (1) inserting the disk, label up, fully into the disk drive and closing the drive door, and (2) entering PR#6 from the keyboard (assuming the disk drive PC card is in slot #6). Booting the disk sets up and starts the game programs.

Copying the disk. This disk is not copy-protected. You are strongly urged to make your own backup copy as the first order of business. Use the Apple System Master program FID to do this. Refer to the Apple DOS manual for instructions. This game disk may be CATALOG'd (on a booted system) in the normal manner. Use the following procedure to copy it:

(1) After booting DOS on your Apple by PR#6-ing another initialized disk — the Apple System Master is OK for this — insert the PLANETMASTER disk into the drive.
(2) Enter LOAD HELLO and RETURN. Wait for the drive to quit.
(3) Remove the PLANETMASTER disk and insert the fresh disk you are copying onto. Make sure there are no other programs on this disk which you want to retain!
(4) Enter INIT HELLO and RETURN. Wait until the disk drive quits.
(5) Remove the copy disk and insert the Apple System Master disk.
(6) Enter BRUN FID and RETURN.
(7) Follow the instructions and prompts given by the FID program. The PLANETMASTER disk is the "source disk" and your own disk copy is the "destination disk". A normal one-drive system uses "slot 6" and "drive 1" for both source and destination disks. The individual PLANETMASTER programs which you will be copying are as follows.

TITLE	START
INTROA	MAIN5
MAIN5A	CRITTERS
SAVE	CHAIN
LOGO SHAPES	FILIN L836
SHAPE ALPHABET	FINALE L894

IMPORTANT NOTE: The PLANETMASTER disk is not write-protected. This is because numerous binary and text files are generated and written to the disk during the course of the game. Do not put a write-protect tab on your copy.

Entering game information. All player inputs and options are clearly defined on each one of the more than 50 game screens. The game is paced entirely by the player. All inputs are simple one-key commands. Just follow

the easy instructions given on-screen as you play.

Unauthorized use. All rights are reserved under applicable Copyright laws covering this product and accompanying documentation, with the exception that single copies of the game disk may be made by the original purchaser for private use only by said purchaser and his/her immediate household. It is against the law to give, sell, lend or otherwise transfer copies of this material to other parties. In the long run, software piracy hurts both of us. Enough said.

Warranty and fine print. The game disk is quaranteed to boot upon receipt by the purchaser. We will promptly replace the product if there's a defect in the disk medium. If we judge the defect to be due to misuse or mishandling, we will charge a nominal fee to cover the cost of the disk medium, duplication and handling/shipping. If returning your disk for any reason, please be sure to include your name and address, a detailed description of the problem, and proof of purchase. You might save yourself some time and postage by calling us first. Because of our "open copy" policy, we cannot accept returns beyond 15 days from the date of original purchase. Read Appendix E before contacting us. Neither Magnetic Harvest nor the program authors are liable for loss or damages, including consequential damages, which are caused directly or indirectly by use of this project.

II. BACKGROUND AND INTRODUCTION

In the year 2323 A.D., the Intergalactic Greenpeace Foundation established the first of a series of orbiting Space Sanctuary Satellites (SSS's), for the purpose of preserving and nurturing endangered species from around the known Universe.

The typical SSS is a medium-sized asteroid which, through the art and science of Terraforming, has been given an atmosphere and climate similar to Earth's — transforming it from a lifeless rock to a green, arable world, suitable for supporting carbon-based life-forms.

III. THE PLANETMASTER

The task of administering these ecological sanctuaries falls to an elite corps of dedicated professionals — the Planetmasters. With many years of intensive training and apprenticeship behind them, the Planetmasters are well suited to act as shepherds to the flocks in their care — species whose frail existence on these lonely islands in space can be extinquished by a moment of inattention or a minor miscalculation in their life support parameters.

The challenge is here unfurled. Can you prove yourself capable of handling the job of Planetmaster? Can you run a Space Sanctuary Satellite for five full years or more without losing to extinction any of the species in your care?

There are five skill levels available in this simulation. You will be asked to select the level of play desired, as follows:

1 — Novice Planettender
2 — Journeyman Planetkeeper
3 — Professional Planetkeeper
4 — Advanced Planetologist
5 — Planetmaster

Difficulty of play increases from level 1 to level 5.

IV. SPECIES SELECTION

The first job of the Planetmaster is to select the unique group of species which will be relocated by teleportation to the SSS. Sadly, there is virtually an unlimited number of species whose endangered status qualifies them as candidates. They come from all manner of originating planets, in all manner of shapes and sizes. Their biological parameters and life support needs all vary. They are generally pathetic, mistreated and otherwise uncared-for — and it may be a difficult task to screen through their pictoral file, to narrow the choice down to a mere half-dozen. For a single Space Sanctuary cannot safely support more than this number.

V. THE SPACE SANCTUARY SATELLITE

Description and Geography. Your SSS is a dodecahedronal-shaped structure approximately 48 kilometers in diameter, segregated into 12 zones. Each zone exhibits a unique climate. The orbit and inclination of the SSS produces 4 seasons of 30 days each per year. Note that there is an upper and lower hemisphere whose seasonal variations are the opposite of each other. Weather conditions (rainfall, temperature and sunlight) vary as much as 25% from the zone norms in each season. Exact weather conditions for an upcoming season cannot be predicted more precisely than this.

Specific geographical descriptions, normal climatic conditions and ranges of variation in climate are all given in Appendix A. A plane projection of the SSS showing zone identities and zone spacial relationships is given in Appendix B.

VI. VEGETATION

Description. The SSS hosts four indigenous food crops which have been genetically-engineered to provide adequate sustenance for the wide range of carbon-based herbivorous and omnivorous species which are relocated there. Each type of plant has growth parameters and characteristics which make it suited to specific climates, as follows:

Plant Name	Optimum Growing Conditions
Duro	Cold, low light, low rainfall
Arva	Hot, high light, dry
Tapi	Hot, high light, wet
Mulk	Temperate conditions

For specific growing parameters for each type of flora, see Appendix C.

Regeneration. Flora will regenerate when depleted by plant-eating species, so long as weather conditions permit. However, since each type of plant requires a minimum land surface area for proper growth, there is an upper bound for total crop yield in each zone. Changes in floral biomass in each zone are given (in KGS.) for each season.

Note that flora takes time to regenerate. The rate of regeneration is specified in terms of percent of previous biomass. Regeneration rates are different for each of the various plant types. Regeneration to a "virgin" zone condition will take longer if the flora is near-totally depleted than if is only partially depleted.

The indigenous flora in a zone cannot be completely depleted. A trace amount (10 KGS.) will always escape consumption by even the most ravenous of species.

Selective consumption patterns, in conjunction with varying regenerative rates and weather conditions, may change the mix of crop types in particular zones during the course of the game.

VII. THE ANIMALS

Location and herding. Species must be herded *"en masse"* from zone to zone to insure their survival. Movement is limited to one zone per season, and the new zone must be one that is neighboring the previous "home" zone that the specie occupied during the preceding season. Only one specie at a time may occupy a zone — a specie may only be herded to an "open zone". Open zones are indicated on the main "Species Zone Placement" screen. Improper zone movement commands will not be accepted. Note that the animal flocks may be moved about in a tentative fashion — actual ecological activity for the coming season does not occur until the placements are set by the "fix zone placements" command. Zone locations for each type of animal are

continously updated on the map. All biological and geographical data may be accessed and scrutinized as much as necessary prior to fixing zone placements.

Food chains. Herbivores will consume flora which is growing in the zone that they currently occupy. Omnivores will eat flora in their occupying zone if it is available; if it is not, they will turn into carnivores. Carnivores will eat other, smaller species located in any of the five zones bordering their own zone.

The amount of food a specie requires is dependent on several factors. First and foremost is basic population. Large populations will, or course, consume large amounts of food. The genetic programming of a specie is another important factor. Each type of animal has a "normal" consumption requirement, expressed in kilograms per day, which describes that animal's regular eating pattern on its home planet, in an optimum environment. In this state, the specie's "metabolic index" is considered to be 1.0.This index will vary according to the actual climate and specie characteristics, as follows:

(1) The metabolic index (and overall appetite) will increase if a cold-blooded specie finds itself in a climate which is warmer than its normal "home" enviornment; the index is decreased if the climate is cooler.
(2) Conversely, the metabolic index of a warm-blooded specie is decreased if it is in a warmer climate than its norm; the index is increased if the climate is cooler.
(3) The metabolic index is additionally influenced by the specie's "hardness factor". This index is unique to each specie. If it is less than 1.0, metabolic changes (either up or down) will be amplified; i.e., consumption requirements will change more drastically upon experiencing temperature differentials. If the index is greater than 1.0, the specie will be less sensitive to changes in zone climates.

The precise metabolic index for an upcoming season cannot be absolutely predetermined, because the weather is somewhat upredictable. However, knowledge of general climatic conditions of a zone, in conjunction with knowing what the specie's optimum living conditions are, will allow a general prediction of metabolic changes. See Appendix D for more information relative to the metabolic index.

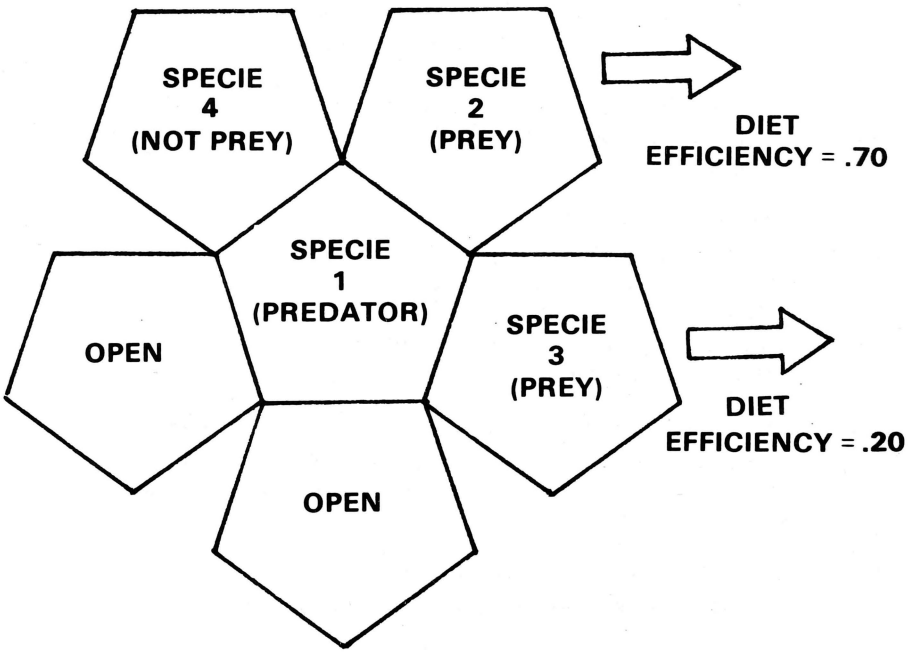
All individual members of a specie population can be expected to follow the same eating patterns. Note that smaller species eat more, relative to their size, than do larger ones. And some species are, by nature, more ravenous than others.

Animal consumption requirements as described above are considered to be a "bulk" food requirement. Actual consumption is reflected in seasonal

ecological reports as kilograms of plants or quantity and type of other species eaten. In addition, a "satisfaction index" is given. This index simply tells whether or not the specie population had enough to eat. A satisfaction index of 1.0 means that it did. An index of less than 1.0 means that not enough food was available, which results in starvation of part of the population. Actual specie consumption is given as it occurs. In this simulation, it is assumed that the entire bulk of plants or prey goes into fulfilling the satisfaction index. Note that severe population reductions can be expected if there is little or no food to eat.

Diet efficiency. Sheer food bulk can keep species from starving, but the actual diet consumed has a great influence on how well the animals survive and thrive. Each specie, be it herbivore, omnivore or carnivore, has a preferred diet. Plant-eating species favor flora which grow best in temperatures nearest those species' own optimum climates. Predators favor prey whose body weight is nearest their own. Note here again that predators do not prey upon animals larger than themselves. While plant-eaters will eat any available flora, and meat-eaters any available prey, the efficiency of their diets will suffer if the food consumed is not the desired food. Low diet efficiencies cause lower birth rates and higher numbers of deaths from natural causes (shorter lifespans).

The net diet efficiency of a specie is a combination (weighted average) of the various types of food it has eaten, if more than one. An example will clarify this.



Consider Specie 1, which is a carnivore whose available prey are Species 2 and 3. In the above example, Specie 4 has a larger body weight than Specie1, and is therefore not available as prey. Specie 1's diet efficiency for Specie 2 is high because Specie 2 is close to Specie 1 in size, and low for Specie 3 because Specie 3 is small relative to Specie 1. To fulfill its consumption requirements, Specie 1 will eat both Specie 2 and Specie 3. Since its diet preference is for Specie 2, it will prey on that animal first — but only enough to fulfill 1/5 (20%) of its bulk dietary needs. Next it will seek out and eat its next-preferred, available prey — Specie 3 in this case — to fulfill another 1/5 (20%) of its diet. If no other available prey is found and its appetite is still unfulfilled, Specie 1 will repeat this eating cycle again, starting with its favorite prey, until its appetite is satisfied. The net diet efficiency for Specie 1 will be factored by the weighted average or "percent of appetite" that each prey contributed — in the above case: $(.70 \times .2) + (.20 \times .2) + (.70 \times .2) + (.20 \times .2) + (.70 \times .2) = .50$.

If, on the other hand, Specie 2's population is completely consumed (made extinct) before fulfilling its normal share of Specie 1's appetite, the balance of Specie 1's appetite will be satisfied by eating more of Specie 3. Again, the net diet efficiency will be factored by the weighted average or "percent of appetite" that each prey contibutes. But in this latter case, the net diet efficiency will be something less than .50 — since a greater quantity of "less-preferred" animals was consumed.

Plant consumption by herbivores and omnivores works in much the same manner, except that their food availability is limited to plants growing within their occupying zone. Plant-eaters will first eat their favorite vegetation. If not enough is available to satisfy their entire population, they will proceed to eat their second choice, then their third and fourth choices. The net diet efficiency reflects the weighted average of the individual diet efficiencies of each plant type consumed.

It should be clear from the above discussion that a specie's diet efficiency during a season will be maximized if its food is limited, by judicious zone placement, to the single source of nourishment which it most desires. However, this may or may not be the best playing strategy at the time. Be aware also that real biological systems resist precise quantification. Whole numbers of animals, not fractional quantities, are involved. As such, mathematics can only provide a close approximation to the manner in which your flocks will operate.

Diet efficiencies of each specie for all plants and prey are accessible for analysis at any time. These values do not change during the course of the game. But they vary from game to game, since specie weight relationships and originating planet environments differ in each game.

Reproduction. The number of offspring per year is primarily influenced by specie size. Smaller animals have more offspring than do larger ones. It is assumed that 1/2 of a specie population is always female and thus capable

of bearing young. Birth takes place in Season 1, regardless of the hemisphere occupied. As mentioned earlier, the birth rate is also influenced by the diet efficiency enjoyed during the birth season. It should be noted that population losses from starvation and natural events are taken before reproduction occurs.

Lifespan. The lifespan of a specie is likewise influenced by size. Larger species live longer than do smaller ones. Lifespan is also affected by diet. Losses from natural causes occur every season. Approximate seasonal losses can be figured by dividing the season's starting population by the lifespan times 4.

Appearance. The physical configurations of species vary greatly. Frontal and temporal views of a typical specimen's cranium are available for supplemental identification purposes.

Hibernation. A specie may go into hibernation if the actual temperature of its current zone is high enough or low enough, compared to its normal or optimum temperature. A specie's hardiness index also affects how readily this will happen; for example, a specie with a low index (less than 1.0) will hibernate quicker than one with a larger index. Animals do not eat when hibernating — but they can still be eaten by predators.

Demographics. Population statistics may be accessed at any time. The percent population change from the preceding season may be reviewed. A record of the starting populations is maintained. Also available is a stacked bar chart showing the relative population of each specie to the total satellite population, for the last 5 years. This shows long-term trends and the relative makeup of the overall population over this period of time.

Miscellaneous. Appendix D lists the various biological characteristics and range of characteristic values which might be exhibited by the entire continuum of endangered intergalactic species.

VIII. PLAYING PERFORMANCE

A performance rating is given for every season played, along with a cumulative rating. This performance rating is a measure of how well the aspiring Planetmaster handled the game scenario, compared to the best possible outcome of each seasonal cycle. A rating of 85% or better with no extinct species indicates successful play at the chosen level.

The game length may be arbitrarily established by the player. A duration of five years is usually a sufficient test of player ability.

APPENDIX A

ZONE CLIMATE CHARACTERISTICS

ZONE	AREA (KM^2)	RAINFALL (IN.) Season 1	2	3	4	LIGHT INDEX Season 1	2	3	4	TEMPERATURE (°C) Season 1	2	3	4	
1	1000	0.9	5.0	3.7	0.9	2.5	3.7	2.5	1.2	-11.2	5.0	-3.7	-16.5	HI
		0.7	4.0	3.0	0.7	2.0	3.0	2.0	1.0	-15.0	4.0	-5.0	-22.0	NORM
		0.5	3.0	2.2	0.5	1.5	2.2	1.5	0.7	-18.7	3.0	-6.2	-27.5	LO
2	900	16.2	36.2	35.0	10.0	10.0	11.2	10.0	8.7	36.2	33.7	33.7	35.0	HI
		13.0	29.0	28.0	8.0	8.0	9.0	8.0	7.0	29.0	27.0	27.0	28.0	NORM
		9.7	21.7	21.0	6.0	6.0	6.7	6.0	5.2	21.7	20.2	20.2	21.0	LO
3	600	11.8	13.1	8.7	6.8	6.2	7.5	6.2	5.0	11.2	30.0	15.0	-1.5	HI
		9.5	10.5	7.0	5.5	5.0	6.0	5.0	4.0	9.0	24.0	12.0	-2.0	NORM
		7.1	7.8	5.2	4.1	3.7	4.5	3.7	3.0	6.7	18.0	9.0	-2.5	LO
4	500	6.8	10.0	10.0	7.5	7.5	8.7	7.5	6.2	11.2	21.2	13.7	3.7	HI
		5.5	8.0	8.0	6.0	6.0	7.0	6.0	5.0	9.0	17.0	11.0	3.0	NORM
		4.1	6.0	6.0	4.5	4.5	5.2	4.5	3.7	6.7	12.7	8.2	2.2	LO
5	700	17.5	22.5	27.5	8.7	8.7	10.0	8.7	7.5	15.0	30.0	22.5	5.0	HI
		14.0	18.0	22.0	7.0	7.0	8.0	7.0	6.0	12.0	24.0	18.0	4.0	NORM
		10.5	13.5	16.5	5.2	5.2	6.0	5.2	4.5	9.0	18.0	13.5	3.0	LO
6	800	1.8	11.2	3.7	1.2	11.2	12.5	11.2	10.0	33.7	38.7	31.2	22.5	HI
		1.5	9.0	3.0	1.0	9.0	10.0	9.0	8.0	27.0	31.0	25.0	18.0	NORM
		1.1	6.7	2.2	0.7	6.7	7.5	6.7	6.0	20.2	23.2	18.7	13.5	LO
7	500	2.5	4.3	5.6	2.5	6.2	5.0	6.2	7.5	16.2	2.5	13.7	28.7	HI
		2.0	3.5	4.5	2.0	5.0	4.0	5.0	6.0	13.0	2.0	11.0	23.0	NORM
		1.5	2.6	3.3	1.5	3.7	3.0	3.7	4.5	9.7	1.5	8.2	17.2	LO
8	600	1.2	1.5	1.2	1.8	7.5	6.2	7.5	8.7	23.7	10.0	21.2	37.5	HI
		1.0	1.2	1.0	1.5	6.0	5.0	6.0	7.0	19.0	8.0	17.0	30.0	NORM
		0.7	0.9	0.7	1.1	4.5	3.7	4.5	5.2	14.2	6.0	12.7	22.5	LO
9	900	0.0	0.0	0.6	0.3	12.5	12.5	12.5	12.5	35.0	21.2	32.5	41.2	HI
		0.0	0.0	0.5	0.2	10.0	10.0	10.0	10.0	28.0	17.0	26.0	33.0	NORM
		0.0	0.0	0.3	0.1	7.5	7.5	7.5	7.5	21.0	12.7	19.5	24.7	LO
10	800	36.2	7.5	5.0	12.5	11.2	10.0	11.2	12.5	36.2	30.0	36.2	38.7	HI
		29.0	6.0	4.0	10.0	9.0	8.0	9.0	10.0	29.0	24.0	29.0	31.0	NORM
		21.7	4.5	3.0	7.5	6.7	6.0	6.7	7.5	21.7	18.0	21.7	23.2	LO
11	700	6.2	10.0	5.0	0.6	8.7	7.5	8.7	10.0	23.7	15.0	20.0	30.0	HI
		5.0	8.0	4.0	0.5	7.0	6.0	7.0	8.0	19.0	12.0	16.0	24.0	NORM
		3.7	6.0	3.0	0.3	5.2	4.5	5.2	6.0	14.2	9.0	12.0	18.0	LO
12	1000	3.7	3.1	2.5	7.5	2.5	1.2	2.5	3.7	-7.5	-30.0	-6.7	21.2	HI
		3.0	2.5	2.0	6.0	2.0	1.0	2.0	3.0	-10.0	-40.0	-9.0	17.0	NORM
		2.2	1.8	1.5	4.5	1.5	0.7	1.5	2.2	-12.5	-50.0	-11.2	12.7	LO

NOTE: On the program Zone Information screen, the "norm" climate values are given for the coming season; "current" climate values are given for the season just ended. Note that "rainfall" and "light index" operate as an inverse tandem; i.e., as seasonal rainfall goes up, the light index goes down by a proportional amount.

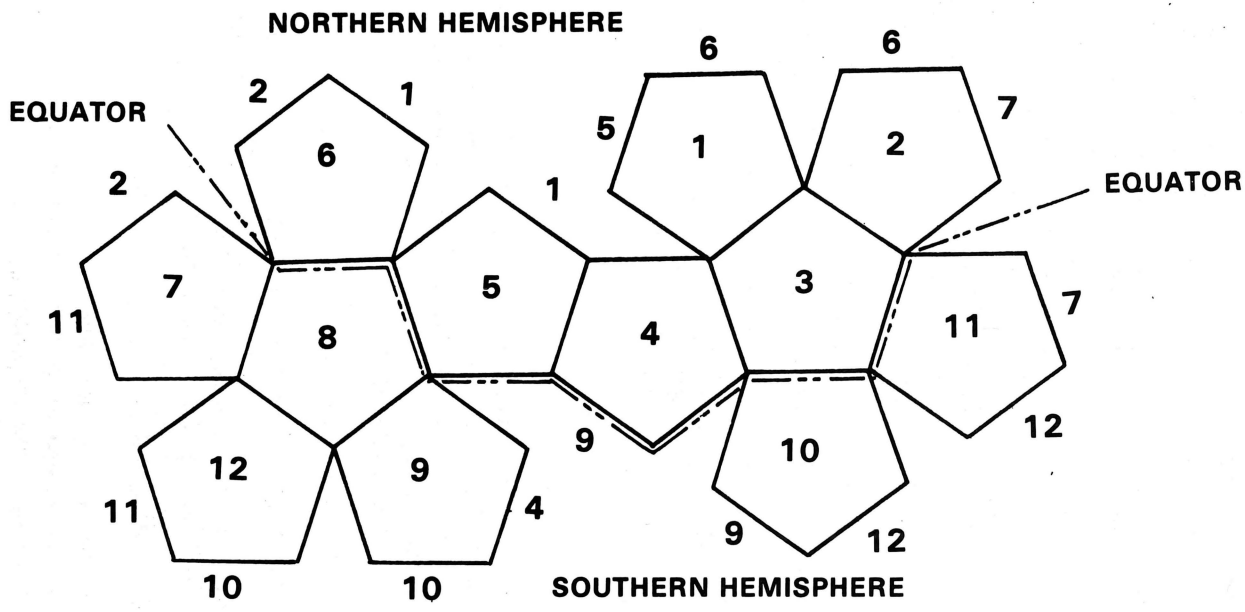
APPENDIX A

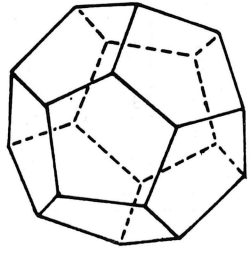
ZONE CLIMATE CHARACTERISTICS

ZONE	GENERAL CLIMATE	DESCRIPTION
1	Arctic Margin	Extremely light precipitation; very short cold summers, extremely long cold winters
2	Rainy Tropical	One or two dry months; all months warm or hot; wet
3	Humid Mid-latitude	Precipitation in all seasons with maximum in summer; warm or hot summers, cold winters
4	Temperate Marine	Moderate total precipitation in all seasons; warm summers, cool winters
5	Humid Subtropical	Precipitation in all seasons with maximum in summer; long warm summers, cool winters
6	Semi-arid Tropical	Light precipitation, rapid evaporation; all months warm or hot
7	Semi-arid Mid-latitude	Light precipitation, warm or hot summers, cool or cold winters
8	Arid Mid-latitude	Extremely light precipitation; warm or hot summers, cool or cold winters
9	Hot Arid	Negligible precipitation, rapid evaporation; all months warm or hot
10	Wet & Dry Tropical	A well-developed dry season with one or two rainy seasons; all months warm or hot
11	Dry Subtropical	Hot dry summers; cool, moderately wet winters
12	Subarctic	Light precipitation; short cool summers, long very cold winters

APPENDIX B

MAP OF THE SPACE SANCTUARY SATELLITE





NOTE: Numbers appearing around the periphery of the map are neighboring zone numbers of each main zone. There are five neighboring zones around each zone. The Space Sanctuary Satellite is a dodecahedron, as shown in the isometric view to the right:

APPENDIX C

PLANT GROWTH CHARACTERISTICS

		PLANT TYPE			
		DURO	ARVA	TAPI	MULK
Rainfall (inches/season)	MAX	7.0	5.0	30.0	15.0
	OPT	5.0	2.5	20.0	10.0
	MIN	3.0	0.1	10.0	5.0
Light Index	MAX	3.0	12.0	11.0	10.0
	OPT	2.0	8.0	9.0	7.0
	MIN	1.0	4.0	7.0	4.0
Temperature (°C)	MAX	15.0	32.5	35.0	20.0
	OPT	0.0	27.0	25.0	12.0
	MIN	-15.0	22.5	15.0	4.0
Normal regeneration rate @ optimum conditions		1.25	1.20	1.40	1.35
Required surface area for growth (KM^2/KG)		.1000	.1500	.0005	.0010
Growth sensitivity factors:*					
Rainfall		.85	.80	.94	.97
Light		.85	.80	.94	.97
Temperature		.80	.80	1.30	.97

*These factors describe, as an inverse function, the relative impact of climatic changes on plant growth, beyond the normal climate ranges noted above. For example, ARVA at .80 is more sensitive to variations in rainfall than is MULK at .97, TAPI at .94, and DURO at .85. This further limits a plant's viability to selected zones/climates.

NOTE: The BASIC algorithm for plant growth is as follows:

NEW CROP QTY = OLD CROP QTY * REGEN RATE * R1 * R2 * R3

R1, R2, and R3 are climate impact factors for rainfall, light index and temperature. They are calculated as follows:

R= (RG - (((RG - 1)* ABS(OC - AC)) / (OC - MC))) / SF

Where RG = Plant regeneration rate
OC = Optimum growth condition (rain, light or temp.)
AC = Actual climate condition
MC = Minimum plant growth requirement
SF = Growth sensitivity factor

APPENDIX D

POSSIBLE RANGES OF SPECIE BIOLOGICAL CHARACTERISTICS

LIFE FORM: Carbon-based
CLASS: Warm-blooded or Cold-blooded
TYPE: Herbivore, Omnivore or Carnivore
BODY WEIGHT: 0.5 to 16.3 KGS
OPTIMUM TEMPERATURE: 0.0 to 32°C
LIFESPAN:1 to 9 years*
OFFSPRING/YEAR/FEMALE: 1 to 69*
DAILY FOOD CONSUMPTION: .04 to 1.72 KGS.*
HARDINESS INDEX: 0.75 to 1.25

*Dependent on weight of animal. Smaller animals eat more, have shorter lifespans and produce more offspring than do larger animals. BASIC algorithms are as follows:

DAILY CONSUMPTION RATE = 2/(BODY WEIGHT * (2 + RND (5)))

NOTE: If the consumption rate derived above is greater than 3 times the body weight, then it is recalculated.

LIFESPAN = 1+ INT(BODY WEIGHT/(2+2*RND(5)))

OFFSPRING = 1 + INT((15+20*RND(5))/BODY WEIGHT)

The BASIC algorithm for calculating the exact Metabolic Index is as follows:

METABOLIC INDEX = ((((OT–AT)/50)*ST)/HI)+1.0

Where OT = Specie optimum temperature
AT = Actual zone temperature
ST = Specie type (+1 for warm, –1 for cold-blooded)
HI = Hardiness index

The BASIC algorithm for calculating the exact seasonal losses from natural causes is as follows:

LOSS = INT ((POP/(4*LS))/SQR(DE))

Where POP = Population of specie
LS = Normal specie lifespan
DE = Net diet efficiency

NOTE: If the seasonal loss from natural causes plus the seasonal loss from starvation is equal to or greater than the population, the loss from natural causes is recalculated as follows:

LOSS = INT(.50*(POP - STARVATION LOSS))

APPENDIX E

MISCELLANEOUS PROGRAM INFORMATION

Program bugs. We sincerely believe this simulation to be free of bugs. We have attempted to provide a high level of error trapping to prevent program "crashes" from unusual player inputs. If you do find a problem, we want to be the first to hear about it. Before contacting us, however, please take just a minute to review the following trouble-shooting suggestions:

(1) The game *must* be started by entering PR#6. Individual program modules are dependent on proper sequencing to assure that the code is being located properly in memory. Starting the game by RUN-ning individual program module names will usually result in a problem.

(2) If you RESET your computer or suffer a power loss at key points in the program, it is conceivable that text or binary files could be generated in a disorganized manner. While this will not usually present a "fatal" problem, do the following if the program seems to act strangely when restarted:

-- CATALOG the disk (your system must have DOS booted for this).

--DELETE all the text (T) files. DELETE all the binary (B) files *except* LOGO SHAPES, SHAPE ALPHABET, CHAIN, FILIN L836 and FINALE L894.

-- Restart (reboot) the game disk and begin a fresh game. Appropriate text and binary files will be generated anew when you start over.

(3) If you choose the game options "Replay using same species" or "Continue suspended game", you must have data from a previous game on the disk. Otherwise, you will receive the error message "Previous game data not found". If you know for a fact that previous game data *is* on the disk, then follow the procedure given in (2) above and try a new game.

(4) This game sets a MAXFILES 1 command when it runs. For this and other reasons, it might be a good idea to power down your system before running other programs or disks.

(5) We recommend that you use your backup copy for normal use. If it starts messing up, try the original disk. Maybe you need to recopy?

(6) If your version has "player history recall" capability, player data is saved to disk every time the simulation is run. Recall is limited to ten (10) different players. After many dozens of games, you may run out of disk space. If you ever receive a DISK FULL error message, you must either recopy the master game programs onto a fresh disk, or else you may DELETE all Text (T) files with player name titles, plus the T file entitled PLAYERS, from your working disk.

Program modifications. The PLANETMASTER programs are LOAD-able, LIST-able, modifiable and SAVE-able. While it's not a good idea to alter the programs on the original master disk, we encourage you to play around a bit with your backup copy.

For example, one change you may want to make is to allow a specie's biological characteristics to be reviewed prior to selecting it for play. This removes some of the challenge from the game, but it can make it more educational. To make this modification, LOAD CRITTERS from your back-up disk (your system must be booted in DOS). Add the following program lines:

```
452 IF H$="Y" THEN GOSUB 727
726 PRINT "HIT 'RETURN' TO CONTINUE": GET J$: RETURN
343 GOSUB 500
746 PRINT
```

Change the following program lines as shown:

```
453 IF T>=7 THEN TEXT: GOSUB 2000: GOTO 1000
455 ~~GOTO 343~~ GOSUB 20200: GOTO 343
```

Resave the program by entering SAVE CRITTERS.

It is also possible to establish your own animal characteristics, rather than letting the computer select them. Some of the major animal variable names and characteristics are listed below. Any or all of them may be input to the program CRITTERS by adding new variable definitions (to supercede the old ones) between lines 2025 and 2495.

Where N = Specie number 1 thru 6:

CR$(N)	is specie name
TYP$(N)	is specie type (warm or cold-blooded herbivore, omnivore or carnivore)
CV(N)	is carnivore flag (0 is no, 1 is yes)
HB(N)	is herbivore flag (0 is no, 1 is yes)
OM (N)	is omnivore flag (0 is no, 1 is yes)
B(N)	is type flag (+1 for warm, -1 for cold-blooded)

SM(N)	is specie weight
TMP(N)	is optimum specie temperature
LS(N)	is specie lifespan
LT(N)	is specie offspring/year
CNS(N)	is specie daily consumption rate
HD(N)	is specie hardiness index

Key plant characteristics may also be established by inserting new variable definitions between lines 30005 and 30100 in program MAIN5. Some of these variables are listed below. You can change any or all of them, as desired.

Where P = Plant number 1 thru 4:

F$(P)	is plant name
F(P,O)	is plant regeneration rate
F(P,1)	is required surface area per KG of plant
F(P,2)	is optimum rainfall
F(P,3)	is maximum rainfall
F(P,4)	is minimum rainfall
F(P,5)	is optimum light index
F(P,6)	is maximum light index
F(P,7)	is minimum light index
F(P,8)	is optimum temperature
F(P,9)	is maximum temperature
F(P,10)	is minimum temperature
F(P,11)	is sensitivity factor for rainfall
F(P,12)	is sensitivity factor for light
F(P,13)	is sensitivity factor for temperature

Revised geographical variables may be added in the same place as new plant variables. Some of these are listed below.

Where R = Zone number 1 thru 12:

ZN(R,0)	is zone surface area
ZN(R,1)	is starting qty. for plant #1 (DURO)
ZN(R,2)	is starting qty. for plant #2 (ARVA)
ZN(R,3)	is starting qty. for plant #3 (TAPI)
ZN(R,4)	is starting qty. for plant #4 (MULK)

Where S = Season 1 thru 4:

Z(R,S,1)	is normal rainfall
Z(R,S,2)	is normal temperature
Z(R,S,3)	is normal light index

Specie populations are carried in variables CR(N,0), where N = specie

numbers 1 thru 6. Different starting populations can be established by inserting new values for these variables in program MAIN5, between lines 33055 and 33995.

USER NOTES

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